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IMAGES IN INTERVENTION

Frequency-Domain Optical Coherence Tomography Assessment of Unfavorable Kissing-Balloon Result in Unprotected Left Main Intervention

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A 67-year-old man with a history of hypertension and dyslipidemia was admitted because of angina symptoms. Coronary angiography (CAG) showed an eccentric lesion of the distal unprotected left main coronary artery (ULMCA) involving the ostium of the left anterior descending coronary artery (LAD) (Fig. 1A). ULMCA/LAD crossover stent implantation was conducted with a 3.5 × 18-mm everolimus-eluting stent (EES) (XIENCE PRIME, Abbott Vascular, Santa Clara, California) at 12 atm, followed by the kissing-balloon technique (KBT). Despite a favorable CAG result (Fig. 2A), frequency-domain optical coherence tomography (FD-OCT) revealed stent strut deformation towards the LAD, leading to a large area of malapposition, mainly because of balloon inflation over an inadequate guidewire position (i.e., behind the stent struts) in the left

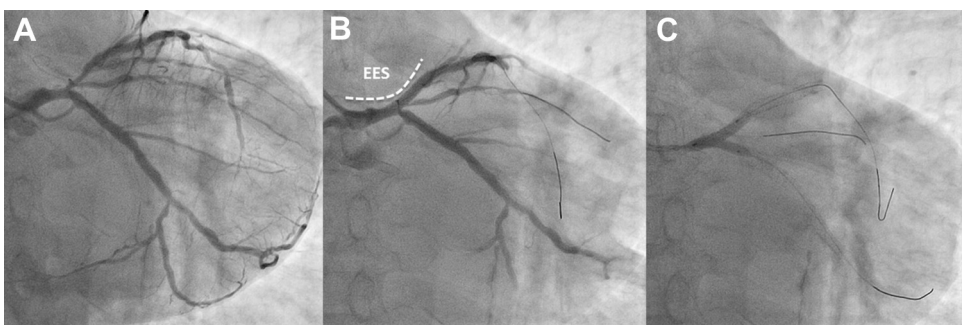

Figure 1. Angiogram Images of Pre-/Post-Stent Implantation With KBT in ULMCA

(A) Angiogram shows a narrowing in the distal unprotected left main coronary artery (ULMCA)/origin of the left anterior descending coronary artery (LAD). **B** shows the crossover everolimus-eluting stent (EES) implantation **(dashed line)** from the ULMCA to the LAD, and **C** demonstrates the kissing-balloon technique (KBT).

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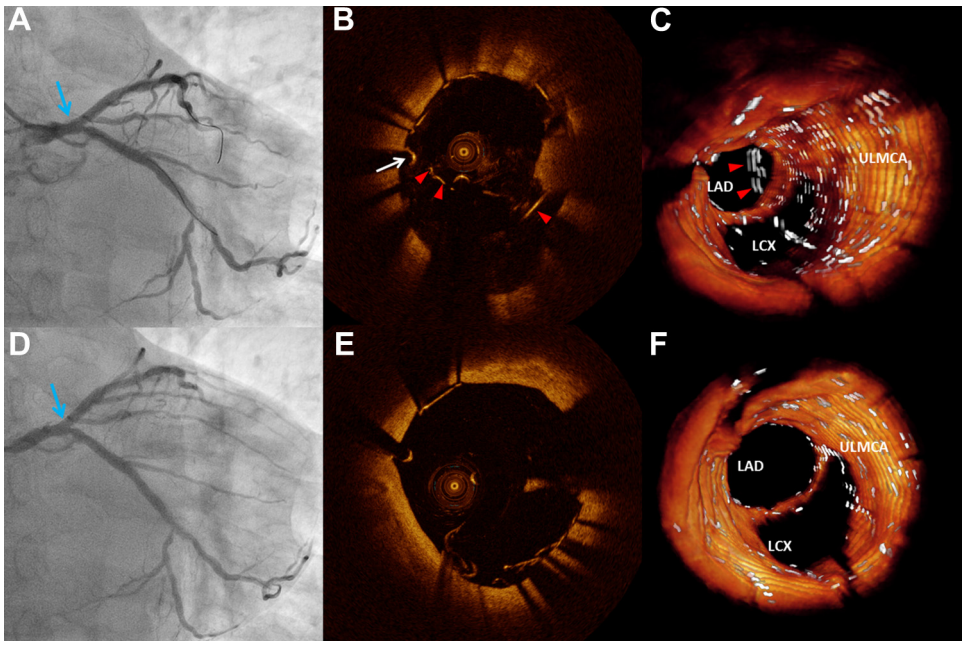

Figure 2. Angiogram and FD-OCT 2- and 3-Dimensional Images After KBT and Post-Balloon Dilation

Blue arrows in the coronary angiograms (CAG) **(left)** correspond to the region represented in the frequency-domain optical coherence tomography (FD-OCT) images **(right)**. In **A**, a favorable angiographic image after KBT is demonstrated; conversely, FD-OCT reveals a large area of malapposed stent struts **(B and C, red arrowheads)** and the inadequate guidewire position in the left circumflex coronary artery (LCX) (i.e., outside the stent struts in the ULMCA body, **[B], white arrow**). After additional balloon post-dilation from the ULMCA to the LAD, CAG **(D)** shows similar results compared with **A**. Conversely, FD-OCT was able to depict the favorable impact of the therapy, leading to improved stent apposition and expansion **(E and F)**. Abbreviations as in Figure 1.

circumflex coronary artery (LCX) (Fig. 2). Information provided by FD-OCT ultimately oriented the guidewire removal and repositioning in the LCX, as well as additional intrastent post-dilation in the ULMCA–LAD with a non-compliant balloon (3.5 × 12 mm) at 22 atm. Marked reduction in stent strut malapposition and adequate stent expansion were demonstrated (Fig. 2).

In the present case, FD-OCT images depicted the poor results with the KBT after ULMCA percutaneous coronary intervention (PCI), results that were otherwise unrevealed by CAG, thereby demonstrating the potential role of FD-OCT to guide PCI in ULMCA distal bifurcation. Whether FD-OCT guidance can improve clinical outcomes in this scenario remains to be determined.

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